

SOP 5: Data Management

This SOP provides additional details on entering data collected during the implementation of SOPs 1 through 4 and 6. There are two data recording media that will be used during the 2016 trial period: paper forms with post-recording entry into a spreadsheet (Excel; .xlsx format) or direct (digital) entry into a Geographic Information System [GIS] format through a Personal Accessory Device (PAD or iPad; see SM 4). The GIS data structure uses ArcGIS on line (AGOL), a web-based map viewer that is accessible to public and private entities. However, direct data entry will require preliminary programming that can only be completed once the data structure ('fields' and metadata or instructions for data entry) is known. Until then, recording of data on paper data forms and entry into a spreadsheet file will be required (Table SOP-5.1; SM 5).

We'll be using the iPads with the [Collector for ArcGIS](#) application to navigate to the sampling plots in the field. Without an ArcGIS Online (AGOL) account, your Data Collectors will not be able to use this application until sites are established via a GIS and may have to use other techniques (i.e, map and compass; Global Positioning System [GPS]) for locating these plots (SM 4).

Every person that will be collecting or viewing entered data will need to have an AGOL account. It is also important for the Coordinators to have an AGOL account. All the data is stored in the ESRI Cloud, so you'll be able to log on and see where the plots are and what has been collected at each refuge (SM 4).

There are three options to get an AGOL account:

1. FWS staff (@fws.gov email) - Please use the following Google form to apply for an account.
<https://docs.google.com/a/fws.gov/forms/d/1vA7FrKIb3QgpRc6qlm958a21M4OHQgQyPXVy40FLaNc/viewform>
You do not need access to ArcGIS Pro and you are not sponsoring a collaborator.
2. If you already have an AGOL account with another Organization (e.g., University), that account will work too. *Ensure your visibility is set to Everyone (public) so that I, Richard Easterbrook, can locate your account and add you to the Monarch Group.*
3. Collaborator - A FWS employee must input a collaborators (Non-FWS Person) information in the above referenced Google form in order to have a collaborator account created. Collaborators will only be able to Join Organizational Groups, edit existing features, share within the organization.

Contact richard_easterbrook@fws.gov once you have your account.

Recording Data on Paper

Recording data with pen and paper (or pencil on write-in-rain sheets) is a time honored method. Advantages include 1) it is economic, 2) less maintenance or breakdown, and 3) provides a record for checking errors. Disadvantages are mainly 1) the amount of time required to transfer recorded data into digital form (nearly double), 2) the potential for error during the transfer, and 3) the realistic possibility to damage and lose data in wet weather. Use of a PAD will save considerable time once users have learned how to navigate, take pictures, and record data electronically on site.

When entering data using either a PAD or a printed data form, keep handy and refer to the metadata-instructions document. This will save a lot of time correcting errors that are committed early in the monitoring process. Once the appropriate entries for the relevant data form fields are memorized, you may not have to use the metadata –instructions document as often, but still keep it with you when recording data.

All data sheets and associated metadata will be available in electronic form for printing, and in hard copy version (SM 5). There may be updated forms following the first month of sampling. Each SOP, excluding SOP 5, has one or more data sheets and a metadata description (Table SOP-5.1).

To Record Data Accurately—

1. Reference the forms in advance and understand what type of data is entered.
2. Review metadata that describes the content for each field, including definition of codes to use and other data entry instructions.
3. Ask questions and find answers from the survey coordinator if you do not understand how data are being recorded.
4. Write legibly. In particular, look for distinguishing 4's from 9's, 1s from 7's, and 3's from 5's or 8's.
5. Be accurate with use of codes, particularly for species names or plot labels. Have your reference sheets available in the field. Create a cheat sheet of codes or data field choices and tape in on your clipboard.
6. Provide comments for data entries that may be unclear or questionable.
7. At the end of each data recording visit, trade data sheets with your partner(s) and check each other's data sheets for the following:
 - all data required for a visit has a completed data sheet, especially for SOP 3 which requires one form per transect; please fill out header data for transect forms that had no data in the subplots during a visit. If the transect could not be completed for some reason (e.g., flooded out), indicate the fact and reason in the comments section of the form and place 'NM' for ***Not Measured*** in large letters in the middle of the otherwise blank data fields. If only specific subplots could not be accessed, place 'NM' in the relevant data field on the form for that subplot.
 - errors in values (e.g., 56 stems of milkweed in a subplot instead of 5 or 6);
 - that the plot label and monitoring area are recorded and the date is correct;
 - legibility of the plant name codes;
 - features of the identity of unknowns are recorded in comments; see Appendix C for suggestions on a system for recording plant acronyms in species are not identified.

Table SOP-5.1. Directory of data sheets used to record measurements of monarch abundance and conditions of their habitat following 2016 standardized operating procedures.

SOP No. and Title	Required Data sheet(s)	Worksheet Name in MMT Data Sheets File ^b	Worksheet Name of Metadata and Entry File ^c
SOP 1: Site Selection, Description and Assessment	<ul style="list-style-type: none"> ➤ SOP 1 sheet 1^a ➤ SOP 1 sheet 2^a ➤ SOP 2 sheet 3 	<ul style="list-style-type: none"> • <i>SOP 1-Sheet1 site description;</i> • <i>SOP1-Sheets 2F,B—RAD;</i> • <i>SOP 2 DS3 Misc Obs of Adults</i> 	<ul style="list-style-type: none"> – <i>SOP 1 Entry Sheets 1-F and 2</i> – <i>SOP 1B Entry RDS-AGC T-Coord.</i> – SOP 1 All Sheets Metadata
SOP 2: Counting Adult Monarchs	<ul style="list-style-type: none"> ➤ SOP 2 sheet 1 ➤ SOP 2 sheet 2 ➤ SOP 1 sheet 1 	<ul style="list-style-type: none"> • <i>SOP 2 DS1 Adult Mon Counts;</i> • <i>SOP 2 Behavior;</i> • <i>SOP 1-Sheet1 site description</i> 	<ul style="list-style-type: none"> – <i>SOP 2 Entry Sheets 1 and 2;</i> – <i>SOP 2 DS 3.</i> – SOP 2 All Sheets metadata
SOP 3: Counting Plants and Immature Monarchs	<ul style="list-style-type: none"> ➤ SOP 3 sheet 1 ➤ SOP 3 sheet 2 ➤ SOP 1 sheet 1 ➤ SOP 2 Sheet 3 	<ul style="list-style-type: none"> • <i>SOP 3 DS1 Bloom Nectar Plants;</i> • <i>SOP 3 DS2 Milkweed Imm Monarchs;</i> • <i>SOP 1-Sheet1 site description;</i> • <i>SOP 2 DS3 Misc Obs of Adults</i> 	<ul style="list-style-type: none"> – <i>SOP 3 Entry for Sheet 1</i> – <i>SOP 3 Entry for Sheet 2</i> – SOP 3 All Sheets Metadata
SOP 4: Estimating Monarch Survival	<ul style="list-style-type: none"> ➤ SOP 4 sheet 1 	<ul style="list-style-type: none"> • <i>SOP 4 DS 1 Mon Morph Survival</i> 	<ul style="list-style-type: none"> – <i>SOP 4Entry for Sheet 1</i> – SOP 4 All Sheets Metadata
SOP 6: Estimating Density and Biomass of Red Imported Fire Ants	<ul style="list-style-type: none"> ➤ SOP 6 sheet 1 	SM 5	SM 5 ^d

^a The form has two pages and is printed on both sides.

^b Master MMT Data Sheets File SOPs 1-4.xlsx.

^c Separate files for each Refuge to accommodate plant lists in data entry worksheet. Names of files = <REF>_Data Entry File Master with MetaData and Instructions_20160613.xlsx, where REF is the 3 character acronym for the refuge.

^d During 2016, SOP 6 will be tested by another party so data files were not included in the relevant spreadsheets

Entering Data from Paper to a Database

Data on paper forms will need to be entered into the spreadsheet (Excel File: MonarchMonitoring_MonitoringAreaName_YYYYMMDD.xlsx) and saved using this naming convention. For all data entry, ***please refer to the metadata file that posts instructions and codes***, located in the same data entry spreadsheet for each monitoring area. Check with your survey coordinator for where this file is stored if you do not know. In the metadata file, you will find that the name of a Monitoring Area is the abbreviation for the general area that you are sampling (Neal Smith NWR and vicinity—**NLS**; Waubay NWR—**WBY**; Washita NWR—**WST**). For the case of data collected on land outside of Waubay NWR and entered on 25 May 2016, the data entry file should be saved as: **MonarchMonitoring_WBY_20160525.xlsx**.

Find out from your Survey Coordinator where data should be saved and stored in the office.
Back up every new data file on a flash drive.

The Collector application will eventually be designed to accept entry of data in the field for all SOPs. Currently, data gathered during implementation of SOP 1 can be recorded, once the 3 associated data sheets for SOP 1 have been downloaded via AGOL. See SM-4 for instructions on how to update the Collector application on your iPad. These data are officially saved once loaded into the cloud (SM 4).

Using AGOL and the Collector Application

The Collector application will be tested for navigating to plots and recording data during the 2016 monarch monitoring trial. Richard Easterbrook (GIS specialist with USFWS-National Wildlife Refuge System), will set-up the required structure and data in AGOL. SM 4 provides instructions on how to enable your iPad to both retrieve information, via AGOL, for functioning as a GPS, and how-to record data, including photographs, in the field.

Quality Assessment

Survey coordinators need to check entered data early on in the monitoring trial and provide feedback on inaccurate entries. Thereafter, check the data regularly (e.g., every 3 weeks) to check for errors and progress. ***It is imperative that data recorded from paper forms are entered in a timely fashion*** because monitoring results will need to be summarized in mid-September and again in October, leaving little time for post-season checking of the entire data set. Also, check to see that data files are being saved under and named by date and are being backed up and saved in the proper location.

Data Security and Archiving

For the monitoring trial in 2016, data entered and uploaded via the Collector app will be backed-up Monday, Wednesdays and Friday mornings by NRPC staff and stored on the T:drive of the local server at IM > Working > Monarch Butterfly > SurveyDataBackups. A final version of checked files will be archived in ServCat as a comma delimited (.csv) flat file under the Monarch Butterfly Monitoring Program.